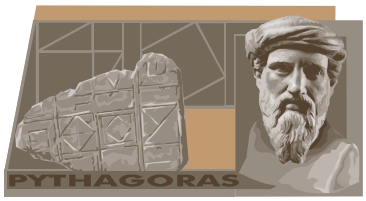
Title: The "Right" Stuff



Brief Overview:

In this unit, students will discover how to classify a triangle as acute, right, or obtuse using the lengths of the sides of the triangle and algebraic properties. The students will also use the Pythagorean theorem to find missing sides of right triangles, and solve real-world application problems. An extension project provides students the opportunity to research the history of the Pythagorean Theorem.

NCTM Content Standard/National Science Education Standard:
Geometry

- Analyze properties and determine attributes of two- and three-dimensional objects;
- Establish the validity of geometric conjectures using deduction, prove theorems, and critique arguments made by others;
- Use trigonometric relationships to determine lengths and angle measures.;

Grade/Level:

High School Geometry

Duration/Length:

Three 60-minute class periods

Student Outcomes:

Students will be able to:

- Classify a triangle as acute, right, or obtuse by the lengths of the sides of the triangle, using the algebraic formulas.
- Find the missing side of a right triangle using the Pythagorean theorem.
- Solve problems with real-world application using the Pythagorean theorem.

Materials and Resources:

- One pound uncooked spaghetti
- Inch rulers
- Protractors
- Response boards (if these materials are not available, paper and markers can be used)
- Poster paper (optional)
- Meter sticks
- Copies of Worksheets
    - Name That Triangle

- Triangle Classification Lab. Parts I and 2
- Triangle Classification Practice
- Finding The Missing Side Of A Right Triangle
- Zip Around
- Finding Areas Of Triangles
- Station Activity

Development/Procedures:

Lesson 1

Preassessment – Assess student understanding and background knowledge with classifying triangles using the resource sheet, "Name That Triangle.".

Launch – Motivate students to think about the properties of triangles by challenging them to solve the problem:

> Given the dimensions of a television cabinet that measures 27" long by 20" wide, what is the largest television that can fit in the cabinet? Explain your answer in words, symbols, or both.
>
> ANSWER: Televisions are measured by the length of their diagonal. So, a television would have to have a diagonal less than 33.6". The most simple method to find the solution is the Pythagorean Theorem: $x^2 = 27^2 + 20^2$. Thus, x is the square root of 1129. Most students will not think of this approach and may or may not come up with alternate solution methods. The purpose of the activity is to stimulate interest in the lessons ahead.

Teacher Facilitation – Divide the class into pairs (or groups of 3 – 4 students), and have groups complete the "Triangle Classification Lab, Part I." In this activity, students will construct triangles using specified lengths of spaghetti noodles. Students will then classify the triangles as acute, right, or obtuse by measuring, with protractors, all of the angles of the constructed triangles.

Student Application – Distribute "Triangle Classification Lab, Part 2" for students to discover the rules for algebraically classifying triangles. These rules are as follows:

$c^2 < a^2 + b^2$ => acute triangle

$c^2 > a^2 + b^2$ => obtuse triangle

$c^2 = a^2 + b^2$ => right triangle

Students calculate all of the missing values, and copy answers from "Triangle Classification Lab Part 1" for the acute, right, or obtuse labels.

Students answer the conjecture questions. Students should then discuss their answers with a partner, and report to class.

Embedded Assessment – Students will practice classifying triangles as acute, right, or obtuse using the above algebraic rules with the worksheet, "Triangle Classification Practice."

Reteaching/Extension –

Students will choose one of four options to research.

- Option 1: Students find a proof of the Pythagorean theorem and present to the class.
- Option 2: Students research the history of the Pythagorean theorem, and present in a one-page written paper or three-minute speech.
- Option 3: Students research the person of Pythagoras and his contributions to Greek society, and present in a one-page written paper or three-minute speech.
- Option 4: Students find five real-life examples of the use of the Pythagorean theorem, and present as poster, power-point or one-page written paper.

Lesson 2

Preassessment – Provide response boards to students, and display problems which review the rules from Lesson 1. The teacher can quickly assess student mastery of classifying triangles as acute, right, and obtuse.

Examples:

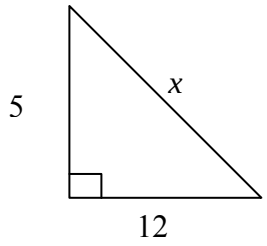
1.	3, 4, 5	$3^2 + 4^2 = 5^2$ RIGHT
2.	2, 5, 2	$2^2 + 2^2 < 5^2$ OBTUSE
3.	6, 3, 7	$3^2 + 6^2 < 7^2$ OBTUSE
4.	10, 11, 12	$10^2 + 11^2 > 12^2$ ACUTE
5.	26, 24, 10	$10^2 + 24^2 = 26^2$ RIGHT

Launch – Re-visit television problem from "launch" in Lesson 1. Discuss the need for the Pythagorean Theorem as an introduction to the development below.

Teacher Facilitation –Model finding a missing side of a triangle using the Pythagorean Theorem.

To find the missing side of a right triangle, a rule called the Pythagorean Theorem can be used. The rule states that the square of the hypotenuse of a right triangle is equal to the sum of the squares of the legs of the triangle. This is what we discovered when determining if a triangle was a right triangle. The rule looks like this: $a^2 + b^2 = c^2$ if a and b are the lengths of the legs, and c is the length of the hypotenuse.

Example 1:



Solution:

$5^2 + 12^2 = x^2$

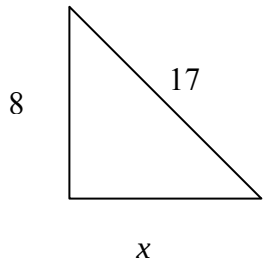
$25 + 144 = x^2$

$169 = x^2$

$\sqrt{169} = \sqrt{x^2}$

$13 = x$

Example 2:



Solution:

$8^2 + x^2 = 17^2$

$64 + x^2 = 289$

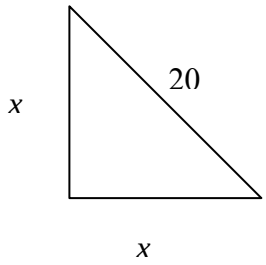
$x^2 = 289 - 64$

$x^2 = 225$

$\sqrt{x} = \sqrt{225}$

$x = 15$

Example 3:



Solution:

$x^2 + x^2 = 20^2$

$2x^2 = 400$

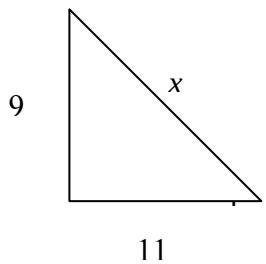
$x^2 = 200$

$\sqrt{x^2} = \sqrt{200}$

$x = 10\sqrt{2}$

$X \approx 14.1$

Example 4:



Solution:

$$10^2 + 5^2 = x^2$$
$$100 + 25 = x^2$$
$$125 = x^2$$
$$\sqrt{125} = \sqrt{x^2}$$
$$5\sqrt{5} = x$$
$$X \approx 11.2$$

Student Application – Students will practice finding the missing side of a right triangle using the worksheet, "Finding The Missing Side Of A Right Triangle."

Embedded Assessment – Students will demonstrate their understanding of finding the missing side of a right triangle by completing the "Zip Around" class activity..

Reteaching – Refer back to the television problem in the "Launch" of Lesson 1. Students can now solve this problem using the Pythagorean Theorem.

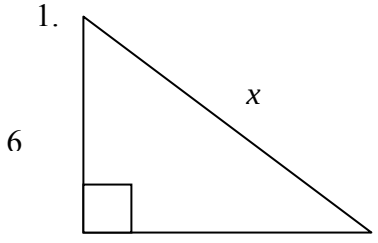
Extension – For advanced students, use the worksheet, "Finding Areas Of Triangles " to have students find areas of triangles using the Pythagorean Theorem.

Lesson 3

Preassessment – Students solve three Pythagorean problems, finding the missing side of a right triangle using response boards.

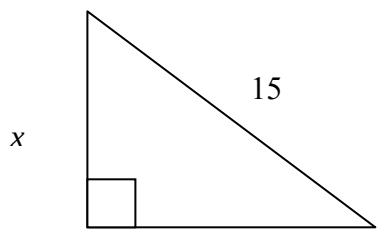
Examples:

1.



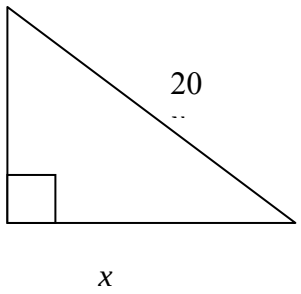
ANSWER: $x = 3\sqrt{13} \approx 10.8$

2.



ANSWER: x = 12

3.



ANSWER: x = 5√15 ≈ 19.4

Launch – Students solve the real-life problem listed below as a think-pair-share activity. First, students solve the problem individually. Next, they have 1-2 minutes to compare answers with a partner. Lastly, a pair is chosen randomly to present to the class. Alternative solutions can be modeled.

Problem: A plane is 10,000 feet in the air. The pilot sights the beginning of the landing strip 20,000 feet away. What is the horizontal distance of the plane to the point above the landing strip?

Student Application – Students will be placed in cooperative groups to do a station activity of real-world problems using the Pythagorean theorem. Place the problems from the Stations Activity on tables, or groups of desks, around the room (one per station). Each group completes a problem at their first station. Then the groups rotate to the next station to answer the next question. This continues until the groups have completed all of the problems. Allow a set amount of time with a timer visible to keep students on track and moving from station to station.

Reteaching/Extension – Cooperative groups are given meter sticks to determine certain lengths by measuring two sides of a right triangle. Groups compare answers when measuring is complete.

Examples:

1. The diagonal length of the classroom door.
2. The measurement classification of the television in the classroom (from previous lessons, this

was discussed to be the diagonal length of the screen).
3. The diagonal length of a bulletin board.
4. The diagonal length of the classroom floor.

Embedded Assessment – Each group is assigned to present one of the problems from the Student Application activity (on the chalkboard, overhead, or poster paper).

Summative Assessment:

Students will be assessed by a unit test incorporating all of the concepts of the unit, and addressing all of the student outcomes.

Authors:

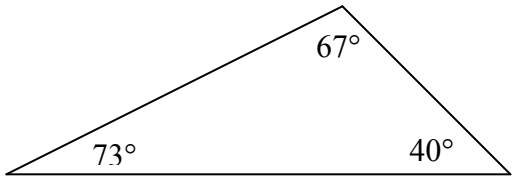
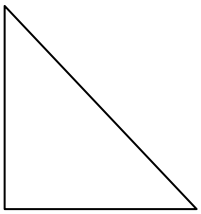
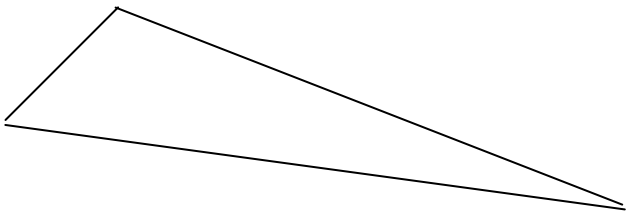
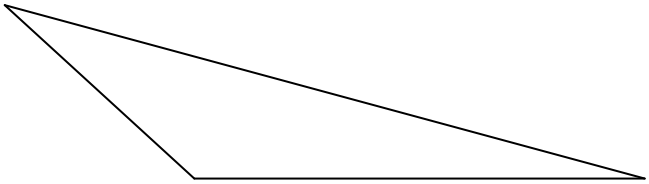
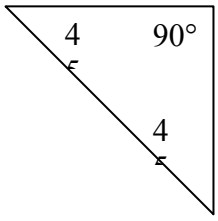
Name Brajendra Sharma
School Spingarn High School
County/Jurisdiction District of Columbia

Name Erin Wheeler
School Kent Island High School
County/Jurisdiction Queen Anne's

Name That Triangle

Name: _____
Date: _____

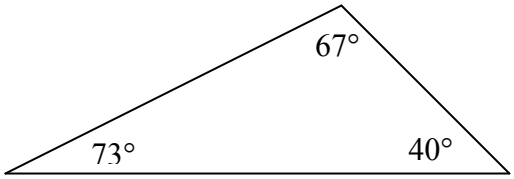
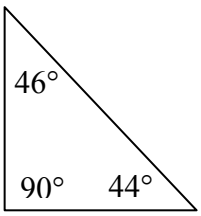
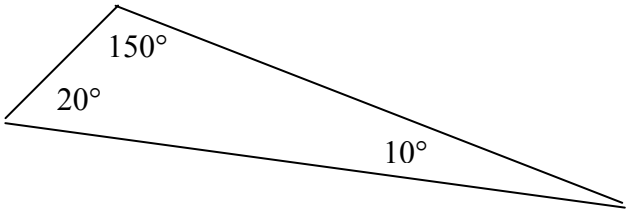
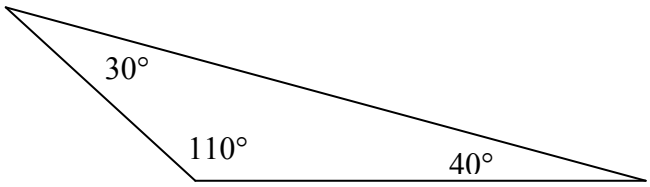
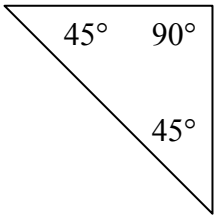
Directions: Identify each triangle as acute, right, or obtuse. (*Drawings are not 'to scale'.*)

	Triangle	Type?
1.		
2.		
3.		
4.		
5.		

Name That Triangle

Name: _ **ANSWER KEY** __
Date: _____

Directions: Identify each triangle as acute, right, or obtuse. (*Drawings are not 'to scale'.*)

	Triangle	Type?
1.		**ACUTE**
2.		**RIGHT**
3.		**OBTUSE**
4.		**OBTUSE**
5.		**RIGHT**

Triangle Classification Lab
PART 1

Name: _____
Date: _____

Directions: For each line in the table,

- Break pieces of spaghetti into the three given lengths, using a ruler.
- Construct a triangle with the three lengths of spaghetti.
- Measure each angle of the triangle using a protractor.
- Classify the triangle as acute, right, or obtuse.

Side Lengths (inches)	Measure Angle 1	Measure Angle 2	Measure Angle 3	Acute, Right or Obtuse?
2, 3, 4				
3, 4, 5				
4, 4, 5				
5, 6, 7				
6, 8, 10				
2, 4, 5				
2, 5, 6				
5, 7, 8				

Triangle Classification Lab
PART 1

Name: _____
Date: _____

Directions: For each line in the table,

- Break pieces of spaghetti into the three given lengths, using a ruler.
- Construct a triangle with the three lengths of spaghetti.
- Measure each angle of the triangle using a protractor.
- Classify the triangle as acute, right, or obtuse.

Side Lengths (inches)	Measure Angle 1	Measure Angle 2	Measure Angle 3	Acute, Right or Obtuse?
2, 3, 4	***100°***	***50°***	***30°***	***OBTUSE***
3, 4, 5	***90°***	***40°***	***50°***	***RIGHT***
4, 4, 5	***80°***	***50°***	***50°***	***ACUTE***
5, 6, 7	***50°***	***70°***	***60°***	***ACUTE***
6, 8, 10	***40°***	***50°***	***90°***	***RIGHT***
2, 4, 5	***25°***	***55°***	***100°***	***OBTUSE***
2, 5, 6	***50°***	***20°***	***110°***	***OBTUSE***
5, 7, 8	***40°***	***60°***	***80°***	***ACUTE***

Triangle Classification Lab
PART 2

Name: _____
Date: _____

Directions: Complete the following table for the triangles constructed in part 1 of the lab. Let *a* be the length of the smallest side of the triangle and let *c* be the length of the longest side of the triangle.

a^2+b^2	**Classify as <, > or =**	c^2	**Classify as acute, right, or obtuse (from lab part 1)**
2^2+3^2 ***=13***	$<$	4^2 ***=16***	***obtuse***
3^2+4^2 =		5^2 =	
4^2+4^2 =		5^2 =	
5^2+6^2 =		7^2 =	
6^2+8^2 =		10^2 =	
2^2+4^2 =		5^2 =	
2^2+5^2 =		6^2 =	
5^2+7^2 =		8^2 =	

Now, make some conjectures:

a) For acute triangles, how does a^2+b^2 compare to c^2?

b) For right triangles, how does a^2+b^2 compare to c^2?

c) For obtuse triangles, how does a^2+b^2 compare to c^2?

Triangle Classification Lab
PART 2

Name: _ **ANSWER KEY** __
Date: _____

Directions: Complete the following table for the triangles constructed in part 1 of the lab. Let *a* be the length of the smallest side of the triangle and let *c* be the length of the longest side of the triangle.

a^2+b^2	**Classify as <, > or =**	c^2	**Classify as acute, right, or obtuse (from lab part 1)**
2^2+3^2 ***=13***	<	4^2 ***=16***	*obtuse*
3^2+4^2 ***= 25***	=	5^2 ***=25***	*right*
4^2+4^2 ***=32***	>	5^2 ***=25***	*acute*
5^2+6^2 ***=61***	>	7^2 ***=49***	*acute*
6^2+8^2 ***=100***	=	10^2 ***=100***	*right*
2^2+4^2 ***=20***	<	5^2 ***=25***	*obtuse*
2^2+5^2 ***=29***	<	6^2 ***=36***	*obtuse*
5^2+7^2 ***=74***	>	8^2 ***=64***	*acute*

Now, make some conjectures:

a) For acute triangles, how does a^2+b^2 compare to c^2? $a^2+b^2>c^2$

b) For right triangles, how does a^2+b^2 compare to c^2? $a^2+b^2=c^2$

c) For obtuse triangles, how does a^2+b^2 compare to c^2? $a^2+b^2<c^2$

Triangle Classification Practice

Name: _____
Date: _____

Rules:

Right triangle => $c^2 = a^2 + b^2$

Acute triangle => $c^2 < a^2 + b^2$

Obtuse triangle => $c^2 > a^2 + b^2$

Directions: Label each of the following triangles with sides the given lengths, as acute, right, or obtuse. Justify your answer. Remember, the largest value must represent side "*c*".

1) 5, 6, 9 _____

2) 5, 5, 8 _____

3) 3, 8, 6 _____

4) 5, 12, 13 _____

5) 10, 11, 12 _____

6) 9, 4, 7 _____

7) 9, 15, 12 _____

8) 10, 10, 10 _____

9) 11, 5, 8 _____

10) 6, 9, 6 _____

Triangle Classification Practice

Name: __ **ANSWER KEY** _
Date: _____

Rules:

Right triangle => $c^2 = a^2 + b^2$

Acute triangle => $c^2 < a^2 + b^2$

Obtuse triangle => $c^2 > a^2 + b^2$

Directions: Label each of the following triangles with sides the given lengths, as acute, right, or obtuse. Justify your answer. Remember, the largest value must represent side "*c*".

1) 5, 6, 9 ***OBTUSE***

2) 5, 5, 8 ***OBTUSE***

3) 3, 8, 6 ***OBTUSE***

4) 5, 12, 13 ***RIGHT***

5) 10, 11, 12 ***ACUTE***

6) 9, 4, 7 ***OBTUSE***

7) 9, 15, 12 ***RIGHT***

8) 10, 10, 10 ***ACUTE***

9) 11, 5, 8 ***OBTUSE***

10) 6, 9, 6 ***OBTUSE***

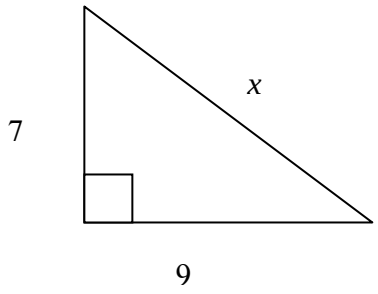
Finding The Missing Side Of A Right Triangle

Name: _____

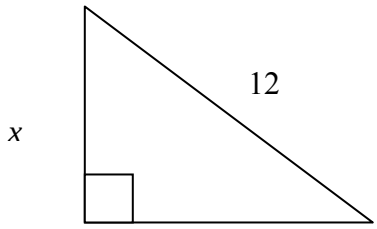
Date: _____

Directions: For each of the triangles below, use Pythagorean Theorem to find the missing side. Leave answers in the simple radical form.

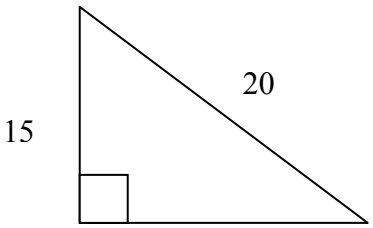
1.



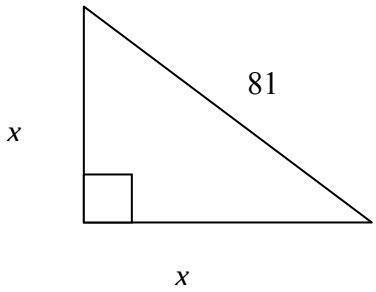
2.



3.



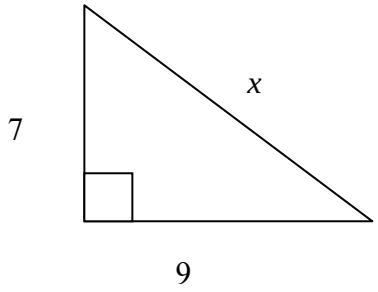
4.



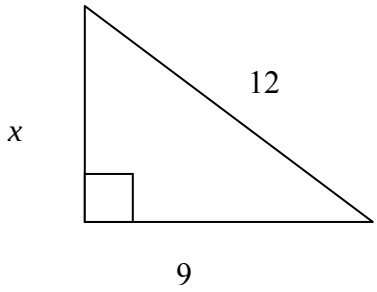
Finding The Missing Side Of A Right Triangle

Name: __**ANSWER KEY**__
Date: _____

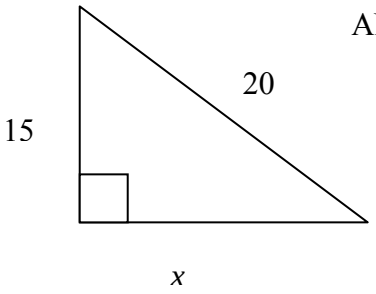
Directions: For each of the triangles below, use Pythagorean Theorem to find the missing side. Leave answers in the simple radical form.

1. 

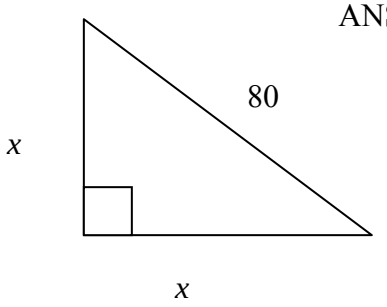
ANSWER: $x = \sqrt{130} \approx 11.4$

2. 

ANSWER: $x = \sqrt{63} = 3\sqrt{7} \approx 7.9$

3. 

ANSWER: $x = \sqrt{175} = 5\sqrt{7} \approx 13.2$

4. 

ANSWER: $x = \sqrt{3200} = 40\sqrt{2} \approx 56.6$

Zip Around

Teacher Directions: Each student is given a card with an answer "I Have …" and a question "You Have…". The first person begins and reads the "You Have" question. Students all solve the problem that is read aloud. The student with the correct answer on their card, says "I Have the answer…". This student then reads the "You Have" question, and the game continues until the last card is read. The individual cards are listed below.

I HAVE… **The beginning card of the game. Listen closely, and solve each problem that is read.** **YOU HAVE…** **The type of triangle formed by sides of lengths 5, 7, and 9.**	**I HAVE…** **An Obtuse Triangle** **YOU HAVE…** **The type of triangle formed by sides of lengths 10, 24, and 26.**
I HAVE,,, **A Right Triangle** **YOU HAVE…** **The type of triangle formed by sides of lengths 12, 14, and 16.**	**I HAVE…** **An Acute triangle** **YOU HAVE…** **The simplified radical form of $\sqrt{400}$.**
I HAVE… **20** **YOU HAVE…** **The simplified radical form of $\sqrt{450}$.**	**I HAVE…** $15\sqrt{2}$ **YOU HAVE…** **The simplified radical form of $3\sqrt{125}$.**
I HAVE… $15\sqrt{5}$ **YOU HAVE…** **The length of a leg of a right triangle if the other leg is 7, and the hypotenuse is 10.**	**I HAVE…** $\sqrt{51}$ **YOU HAVE…** **The length of the hypotenuse of a right triangle, if the legs are length 10 and 6.**
I HAVE… $2\sqrt{34}$ **YOU HAVE…** **The length of the side of a square if the length of the diagonal is 40 units.**	**I HAVE…** $2\sqrt{5}$ **YOU HAVE…** **The length of a leg of a right triangle if the other leg is 12, and the hypotenuse is 15.**

Zip Around (Continued)

I HAVE… **9** **YOU HAVE…** **The length of the diagonal of a square if the side length is 12.**	**I HAVE…** $12\sqrt{2}$ **YOU HAVE…** **The area of a triangle whose base is 10 units, and whose height is 12 units.**
I HAVE… **60** **YOU HAVE…** **The area of a right triangle with a hypotenuse of 20 and a leg of 12.**	**I HAVE…** **96** **YOU HAVE…** **The area of a rectangle with a diagonal of 26 units, and a length of 24 units.**
I HAVE… **120** **YOU HAVE…** **The hypotenuse of a right triangle with legs of length 6 and 12.**	**I HAVE…** $6\sqrt{5}$ **YOU HAVE…** **The leg of a right triangle with a hypotenuse of 20 and a leg of 10.**
I HAVE… $10\sqrt{3}$ **YOU HAVE…** **The hypotenuse of a right triangle with legs of length 5 and** $5\sqrt{3}$ **.**	**I HAVE…** **10** **YOU HAVE…** **Is 18, 24, 30 a Pythagorean triple?**
I HAVE… **Yes** **I HAVE…** **Is 6, 7, 10 a Pythagorean triple?**	**YOU HAVE…** **No** **I HAVE…** **This is the end! Great job everyone!!!**

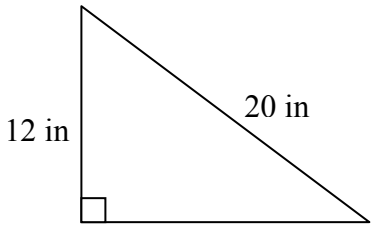
Finding Areas Of Triangles

Name: _____
Date: _____

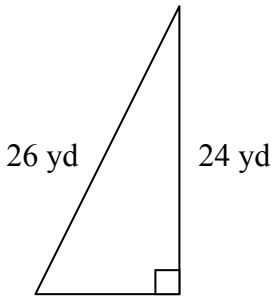
Directions:

- Find the length of the missing side of each triangle.
- Find the area of each of the triangles.
- Explain all of your answers in words, symbols, or both.

1.



2.



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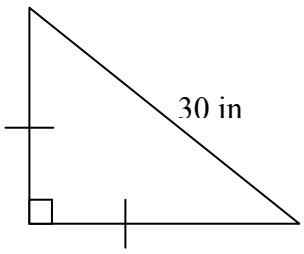

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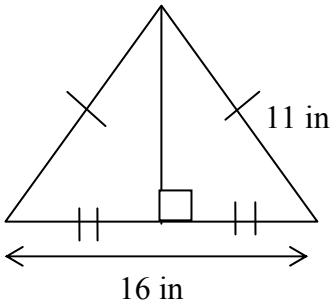


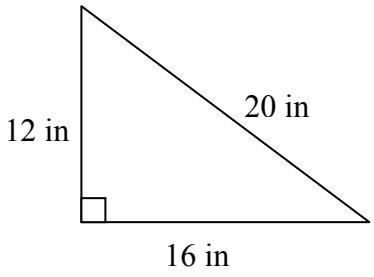
Finding Areas Of Triangles

Name: **ANSWER KEY__**
Date: _____

Directions:

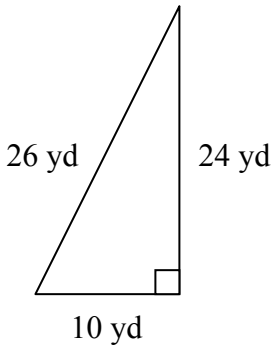
- Find the length of the missing side of each triangle.
- Find the area of each of triangles.
- Explain all of your answers in words, symbols, or both.

1.



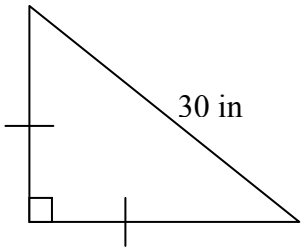
Area = 96 SQ. IN.

2.



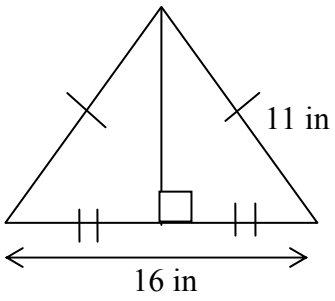
Area = 120 SQ. YD.

3.



Area = 224.72 SQ. IN.

4.



Area = 60.4 SQ. IN.

Station Activity
Word Problems

(Students should leave answers in decimal form.)

1. The base of a television is 60 inches and its height is 36 inches. What would be the size of this TV? (Hint: Find the diagonal.)

2. Public Works plans to build a walkway diagonally in the Square Park. What is the length of the walkway if the Square Park is 9000 feet long?

3. A 25 ft. ladder is leaning against Mrs. Smith's house. The base of the ladder is 9 ft. from her house. How high up the building does the ladder reach?

4. The fire department is summoned to save a cat stuck on the ledge of a building. This ledge is 52 ft. above ground. What should be the length of the ladder that can reach the cat if the base of the ladder is kept 20 ft. away from the wall?

5. A brick walkway forms the diagonal of a rectangular playground. The walkway is 164ft. long. This playground is 30 ft. wide. What is the length of this playground?

6. John was flying a kite. His kite is stuck on top of a 250 ft. high pole. He is standing 640 ft. away from that pole. What is the length of the string in use?

7. A door has dimensions of 8 ft. X 5 ft. What is the maximum length of a cabinet that can vertically pass through this door?

8. Find the altitude of an equilateral triangle with side length of 12 meters.

9. Jane planted a tree in her yard on the Arbor Day. To stabilize the sapling she uses two guy (support) wires. The angle each wire forms with the tree is 45 degrees. These wires are pegged to the ground 4 ft. away from the base of the tree. How long is one of the guy wires? (Assume the tree is perpendicular to the ground.)

10. A right triangle forms one half of a rectangle. The hypotenuse of this triangle is 100 ft. and one of the sides is 36 ft. Find the area of this rectangle.

Station Activity **ANSWER KEY**
Word Problems

(Students should leave answers in decimal form.)

1. The base of a television is 60 inches and its' height is 36 inches. What would be the size of this TV? (Hint: Find the diagonal.)

   ANSWER: 70 in.

2. Public Works plans to build a walkway diagonally in the Square Park. What is the length of the walkway if the Square Park is 9000 feet long?

   ANSWER: 12727.9 ft.

3. A 25 ft. ladder is leaning against Mrs. Smith's house. The base of the ladder is 9 ft. from her house. How high up the building does the ladder reach?

   ANSWER: 23.3 ft

4. The fire department is summoned to save a cat stuck on the ledge of a building. This ledge is 52 ft. above ground. What should be the length of the ladder that can reach the cat if the base of the ladder is kept 20 ft. away from the wall?

   ANSWER: 55.7 ft

5. A brick walkway forms the diagonal of a rectangular playground. The walkway is 164 ft. long. This playground is 30 ft. wide. What is the length of this playground?

   ANSWER: 161.2 ft.

6. John was flying a kite. His kite is stuck on top of a 250 ft. high pole. He is standing 640 ft. away from that pole. What is the length of the string in use?

   ANSWER: 687.1 ft.

7. A door has dimensions of 8 ft. X 5 ft. What is the maximum length of a cabinet that can vertically pass through this door?

   ANSWER: 9.4 ft.

8. Find the altitude of an equilateral triangle with side length of 12 meters.

   ANSWER: 10.4 m.

9. Jane planted a tree in her yard on the Arbor Day. To stabilize the sapling she uses two guy (support) wires. The angle each wire forms with the tree is 45 degrees. These wires are pegged to the ground 4 ft. away from the base of the tree. How long is one of the guy wires? (Assume the tree is perpendicular to the ground.)

   ANSWER: 5.66 ft.

10. A right triangle forms one half of a rectangle. The hypotenuse of this triangle is 100 ft. and one of the sides is 36 ft. Find the area of this rectangle.

    ANSWER: 3358.6 sq. ft

Summative Assessment

Name: _____
Date: _____

I. Classify each of the following as an acute, a right, or an obtuse triangle. Justify your answer.

1. 10, 24, 26 _____

2. 5, 5, 5 _____

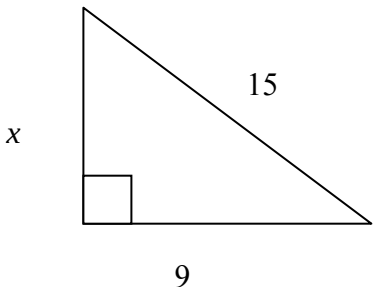
3. 2, 5, 6 _____

4. 5, 7, 8 _____

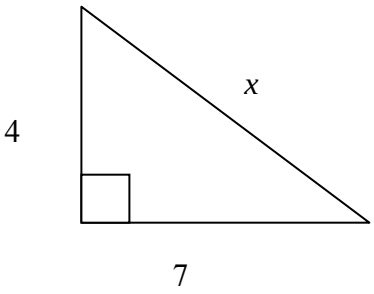
5. 1, 2, 3 _____

II. For each of the triangles below, use the Pythagorean Theorem to find the length of the missing side. Explain your answer in words, symbols, or both.

6.



7.



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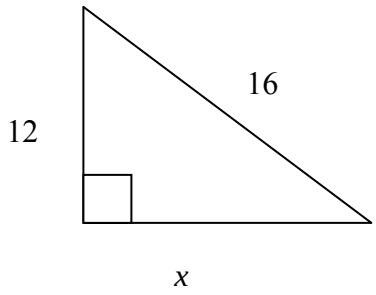
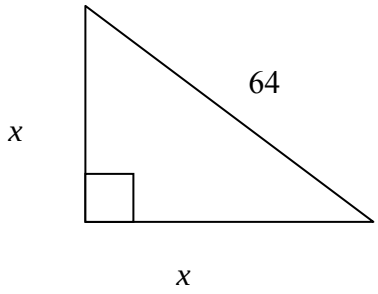


9.



III. Solve each of the following application problems. Explain your answer in words, symbols, or both.

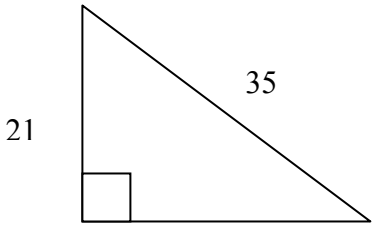
1. The opening of a television cabinet is 40" long by 32" wide. What is the largest size television that could fit into the cabinet? (Hint: Remember that a television is sized by the length of the diagonal of the screen.)

2. The pilot of a plane sights the airport. His instruments tell him that he is 16, 532 feet in altitude, and that his horizontal distance to the airport is 50,354 feet. What is his direct distance to the airport?

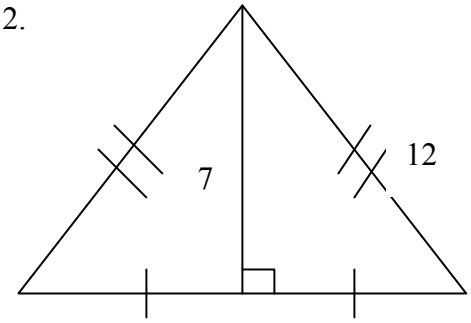
3. Mr. Jones has been given enough brick to make a 60 foot long walkway. He has a 37 foot wide space to make a rectangular garden, so that the walkway could go diagonally across. What is the maximum length that he could make the garden?

IV. Bonus: Find the area of each of the triangles below. Explain your answer in words, symbols, or both.

1.



2.



Summative Assessment

Name: ___ **ANSWER KEY**
Date: _____

I. Classify each of the following as an acute, a right, or an obtuse triangle. Justify your answer.

1. 10, 24, 26 **RIGHT**

2. 5, 5, 5 **ACUTE**

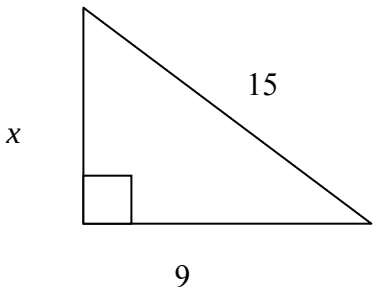
3. 2, 5, 6 **OBTUSE**

4. 5, 7, 8 **ACUTE**

5. 1, 2, 3 **OBTUSE**

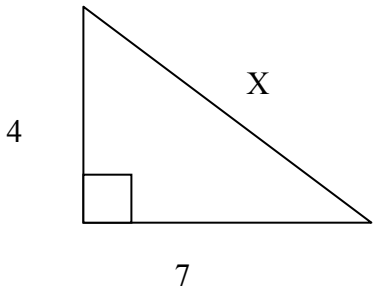
II. For each of the triangles below, use Pythagorean Theorem to find the missing side. Explain your answer in words, symbols, or both. Leave your answers in the simple radical form.

6.



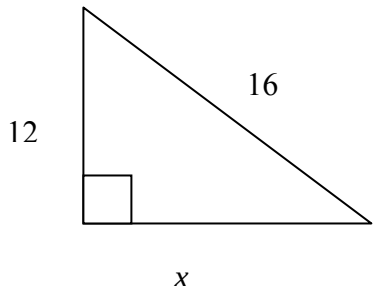
ANSWER = 12

7.



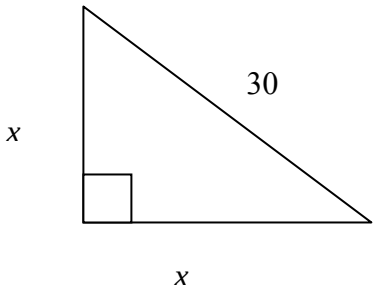
ANSWER = $\sqrt{65} \approx 8.1$

8.



ANSWER = $4\sqrt{7} \approx 10.6$

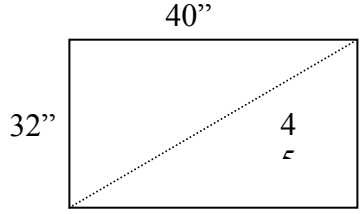
9.



ANSWER = $15\sqrt{2} \approx 21.2$

III. Solve each of the following application problems. Explain your answer in words, symbols, or both.

1. The opening of a television cabinet is 40" long by 32" wide. What is the largest size television that could fit into the cabinet? (Hint: Remember that a television is sized by the length of the diagonal of the screen.)

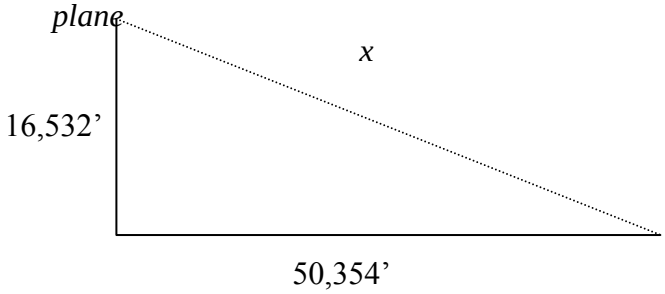


$40^2 + 32^2 = x^2$

$2624 = x^2$

$x \approx 51.2$"

2. The pilot of a plane sights the airport. His instruments tell him that he is 16, 532 feet in altitude, and that his horizontal distance to the airport is 50,354 feet. What is his direct distance to the airport?

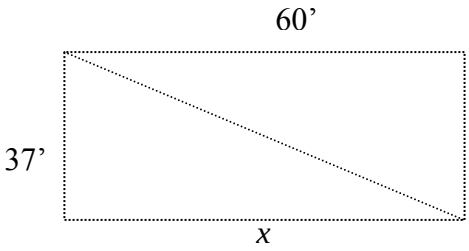


$16{,}532^2 + 50{,}354^2 = x^2$

$2808832340 = x^2$

$x \approx 52998.4$ feet

3. Mr. Jones has been given enough brick to make a 60 foot long walkway. He has a 37 foot wide space to make a rectangular garden, so that the walkway could go diagonally across. What is the maximum length that he could make the garden?



$37^2 + x^2 = 60^2$

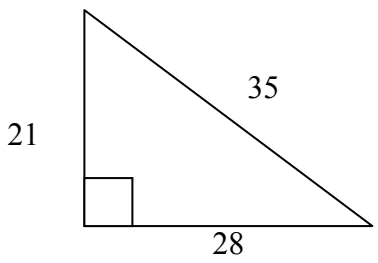
$x^2 = 60^2 - 37^2$

$x^2 = 2231$

$x \approx 47.2$'

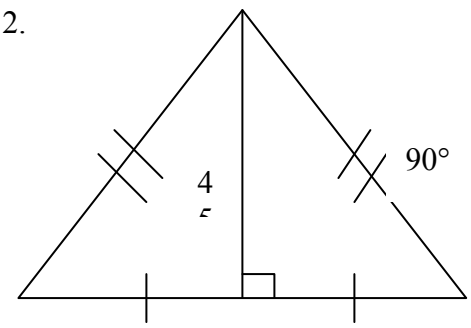
IV. Bonus: Find the area of each of the triangles below. Explain your answer in words, symbols, or both.

1.



AREA = 294

2.



AREA = 108